Claim Amendments

Amend the claims as follows:

1. (currently amended) A band model method for determining individual atomic and molecular species spectral transmittances through a gaseous medium, the method comprising the steps of:

providing atomic and molecular transition data for a given spectral range and atmospheric conditions;

selecting a spectral region to be considered;

dividing the spectral region into a number of spectral bins that determine a spectral resolution, each bin having a width of ~~less than 1.0~~about 0.1 cm^{-1} or less;

calculating atomic and molecular species line center absorption from at least an equivalent width of the atomic and molecular transitions centered within each spectral bin;

calculating line tail absorption within each spectral bin from atomic and molecular transitions not centered within the bin;

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated line center absorptions and the calculated line tail absorptions; and

~~using~~outputting the determined spectral transmittances ~~in analysis of atmospheric optical sensor data~~.

2. (canceled)

3. (previously presented) The method of claim 1 wherein the calculating line center absorption step includes calculating, from an exact expansion, a bin Voigt equivalent width of atomic and molecular transitions whose centers lie within the spectral bin.

4. (previously presented) The method of claim 3, wherein the exact expansion is an exact modified Bessel functions expansion.

5. (previously presented) The method of claim 3, wherein the calculating line tail absorption step includes subtracting line-tail absorption as calculated from a column strength, a Lorentz half-width, a Doppler half-width, and a line tail spectral displacement.

6. (previously presented) The method of claim 3, wherein the calculating line center absorption step includes determining a Voigt line-shape function computed at specific frequencies.

7. (previously presented) The method of claim 1, wherein the line tail calculation step includes calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves.

8. (previously presented) The method of claim 7, wherein the line tail absorption calculation step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

9. (previously presented) The method of claim 8, wherein there are five Padé parameters.

10. (previously presented) The method of claim 8, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

11. (previously presented) The method of claim 10, wherein each bin has a center and two edges, and one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

12. (previously presented) The method of claim 10, wherein one Padé parameter is the derivative of the absorption coefficient with respect to a normalized spectral variable at the line center.

13. (previously presented) The method of claim 10, wherein one Padé parameter is the integral of the spectral absorption coefficient over a spectral band.

14. (previously presented) The method of claim 8, wherein the Padé database is generated for a plurality of temperatures.

15. (previously presented) The method of claim 8, wherein the Padé database is determined for a plurality of pressures.

16. (currently amended) The method of claim 1, wherein the line center absorptions are calculated from atomic and molecular transitions centered no more than half a spectral bin width from the bin, and the line tail absorptions are calculated from atomic and molecular transitions not centered within a half spectral bin width from the bin.

17. (currently amended) A method for computing the contribution of line centers to a determination of individual atomic and molecular species spectral transmittances through a gaseous medium, the method comprising the steps of:

providing atomic and molecular transition data for a given spectral range and atmospheric conditions;

selecting a spectral region to be considered;

dividing the spectral region into a number of spectral bins that determine a spectral resolution, each bin having a width of ~~less than 1.0~~about 0.1 cm^{-1} or less;

calculating a bin Voigt equivalent width of atomic and molecular transitions centered within each spectral bin from an exact expansion;

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated equivalent widths; and

~~using~~outputting the determined spectral transmittances ~~in analysis of atmospheric optical sensor data~~.

18. (canceled)

19. (canceled)

20. (previously presented) The method of claim 17, wherein the exact expansion is an exact modified Bessel functions expansion.

21. (previously presented) The method of claim 17, wherein the calculating step includes subtracting line-tail absorption as calculated from a column strength, a Lorentz half-width, a Doppler half-width, and a line tail spectral displacement.

22. (previously presented) The method of claim 17, wherein the calculating step includes determining a Voigt line-shape function computed at specific spectral frequencies.

23. (currently amended) A method for computing the contribution of line tails to the determination of individual atomic and molecular species spectral transmittances through a gaseous medium, the method comprising the steps of:

providing atomic and molecular transition data for a given spectral range and atmospheric conditions;

selecting a spectral region to be considered;

dividing the spectral region into a number of spectral bins that determine a spectral resolution, each bin having a width of ~~less than 1.0~~about 0.1 cm^{-1} or less;

calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves;

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated line tail absorptions; and

~~using~~outputting the determined spectral transmittances ~~in analysis of atmospheric optical sensor data~~.

24. (previously presented) The method of claim 23, wherein the calculating step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

25. (previously presented) The method of claim 24, wherein there are five Padé parameters.

26. (previously presented) The method of claim 24, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

27. (previously presented) The method of claim 26, wherein each bin has a center and two edges, and one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

28. (previously presented) The method of claim 24, wherein one Padé parameter is the derivative of the absorption coefficient with respect to a normalized spectral variable at the line center.

29. (previously presented) The method of claim 24, wherein one Padé parameter is the integral of the spectral absorption coefficient over a spectral band.

30. (previously presented) The method of claim 24, wherein the Padé database is generated for a plurality of temperatures.

31. (previously presented) The method of claim 24, wherein the Padé database is determined for a plurality of pressures.

32. (canceled)

33. (canceled)